Notebook Series -- Notebooks by Edison
Notebook, N-14-10-04

This notebook was used during the period October-November 1914. It is the fourth of a four-book series, preceded by N-14-09-30. The entries, which are by Edison and an unidentified experimenter, pertain to the Condensite varnish surfaces applied to disc record blanks during the transfer and printing process. Entries toward the beginning of the book describe experiments relating to the ingredients and chemical reactions involved in making different varnish compounds. Among the subjects of Edison's experiments are varnishes containing varying amounts of phenol, alcohol, "para" (paraphenylenediamine), "penta" (penatchloraphenol), "6/4" (hexamethylene tetramine), phenylhydrazine, and other compounds. Archie D. Hoffman and Frederick Ott assisted him in these experiments. Other groups of experiments involved resin from the African sandarac tree and the synthesis of phenol (in short supply because of the wartime naval blockade against Germany) from benzol. At the end of the book is a four-page table by an unidentified experimenter summarizing the manufacture and condition of records made with varying amounts of 6/4 solution and varnishes from different numbered lots. Inserted into the book are several loose pages of notes by Edison pertaining to experimental varnishes made with dammar, a botanical resin. Another page contains a drawing of distillation apparatus, possibly by Jonas W. Aylsworth. The front cover is labeled "Disc 4 Records." The pages are unnumbered. Approximately 60 pages have been used.

15 E
25 phenol
6 2/0 6/4
1/2 Para
3 Chlorinated Solvent Nap
5 Doso 5 gms Lot Cleaked

Hard to get any leavin -
Crystalized out bad -

16 E 25 phenol
6 6/4
1/2 Para
6 Chlorinated Solvent Nap
Went Very thick & Crystalized
out bad & not much leavin -

Towards end when thick
it foamed bad - No 17
student,

17E
25 phenol
6 6/4
½ para
3 Penta Red like crystals got from alcohol by Ney
The penta from which this is made from is alkaline soluble penta got out by Ney —

This crystallizes out like all the others 15 + 16 while alcohol is evap but when its evaporated the 6/4 dissolves good in the phenol Penta & makes a high yield resin & good

Evidently the function of Penta is to prevent 6/4 from crystallizing out or it makes it more soluble in phenol & Resin & prevents segregation in vacuum after heating

18E Test tube full saturated alcoholic 6/4 — marked test tube full to mark of alcoholic ammonia about gram or 1½ g — creeps with without para - crystals both cases & fractions

19E Test tube full sat 6/4 —
1 gram Neys alcoholic Extract salted from alkali salt Extraction Penta: — This is not very soluble scarcely ½ went into solution Creeps + without Para fine white adherent coating of crystals all over not only but dry with para [illegible] wet + also apparently crystallizes fine cry
22 is better than 19

No 20 Dup 18
Except 1 gram alpha Naphthol
Not much Creep in Either Case
Count fell Cry with & without para
para keeps liquid. + there is a
red [redacted] as to Violet both with & without
are Syrupy Especially with Para
this.

21 Dup 18
Except 1 gram Chlorinated
Naphthalene made by Grathe
No good apparently where alcohol
dissolves some but when
Cold precipitates out -
No good Crystallizes Easily

22 Dup of 18
Extracted by E from Crude Pentha
by alcohol no alkali -
1 gram
after pouring out robustly after
considerable of Coagulant [redacted] off
Comes out in liquid

There is no crystallization - "settles out
as mud - very little Creeping
Compared to 23 - only bad feature if it is
bad is that unlike other chemicals in
this group a large amount settles
out Slowly when there is little alcohol &
more comes out as it comp.

23 Dup of 18
Except 1 gram Hum Dammar

Weight of Alcohol used in all
from #18 to 22 is
16.710 grams

23 This seems to prevent crystallization
to a certain extent
its no better with para than without
without considerable Creeping
Think this is good - Smallpapered Soil

with or without Para

As far as 18 to 23 Expts

The penta extract by Nye leaves some crystals 19
#22 " " Edison-Tarr in Commercial as
sediment but there is no final crystallization
of 6/4 either with or without Para
simply a mud when all evap in
both Cases +

23 - Dammar feel no crystals in either case
think this will prevent 6/4 from forming
crystals of any size.
It difficult to dissolve in alcohol
must find something to add to
alcohol to increase solubility

20. This may help if free phenol is
low must be quite low or only
2 or 3% used.

All these Experiments Ord Temp

Amount of material dissolved or should
have dissolved in 1
Alcohol saturated with 6/4

18 - unknown
19 8.6 grams in 145 grams Alcohol dissolved
20 8.6 " " all dis
21 8.6 " Very little dis
22 8.6 " nearly all dissolved 80%
23 8.6 " " 70%
Equivalent to 8.6% of Resin if all dis —
860 - Mils of Para dissolved in 145 al. all dis
no precipitates —

On heating 20 Condenses. =

Looks as if Dammar & Edison Extract
of Penta — using 2 para + 4 penta
Instead 6 to slap something out of
mud would be best, for Vermin -

Notice 22 - Part left in bottle
nearly all mud settled out, its
insolubility no changed by putting
in some alcoholic Ammonia —

22 = I also notice that a new portion of 22 is very colour ... power alcoholic ammonia + 6/4 seems to dissolve OK —

Note - No 24

50 alcohol DEN -
at 80 Fahr just powder by much shaking to get 5 grms 6/4 dry into it = at 66° Fahr we see that nothing crystalizes out. I now add 1½ grams penta dol in alcohol. Washed & Extracted by Edison - nearly all discolors, light floating stuff very minute in quantity

Note, 50 grms alcohol
4 grams water added
Enormously increases
solubility 24

Note,
Note, phenol solid of little alcoholic ammonia put in just enough to make it liquid + no more, increasing the bulk very little, Does not go solid in Refrigerator close to Ice —
English

No 25

Note = at 82 Fahr 50 grms our Reg DEN alcohol ~~Cont~~ to which 4 grms water added Dissolves 8½ grams 6/4 Nearly twice as much as alcohol alone — nothing chills out at 70°

Note - from Expt 22
Edison alcoholic Extraction reg Penta - Muddy - by adding little alcoholic ammonia 22 Clears some - adding water just a little Clears it more
Residue in flask from 22 Expmt —

25 Continued I put 1½ grams of Alcoholic Extract from Crushed Pentia made by Eckson — it develops about as well as in 24 — Cant say that there is any more flocculent undeveloped in 25 than 24 — by close Examination appears that 25 is more muddy than 24.

at 552 I poured equal quantity of 24 + 25 on two bottles dilute in at 554 No 24 shows the Pentia precipitating fast no signs of precip in 25 at same time,

6 pm turbidity comes out 24 + clots — some coming out of 25 —
at 505 — about same much has come out of 24 + some out 25 If there is any favorable symptom it favors 25 —

I now put 1 gram of Para in 24 + 25.
This is equal to 3% Para in Varnish —

Both 24 + 25 Pentia settles out but not so quick as without it also it dont clear but always fine — both act about same. 25 Sol seems get thicker than 24 on little plate.

I now put 2 grams Alcoholic Ammonia in both 24 + 25 — rough measurement —

Seems to keep cleared + dont notice settling out in 10 minutes but its hard to see Sol dark

25 with + without NH_4 — shows signs Coagulation scum on top — Gelatinous to stronger — 6/4 I guess — Pentia dont seem well but much like the hard to see

Oct 4 Sunday

We now put in 30 grams Resin in 24 & in 25

24 & 25 – Before Resin –
notice Alcoholic Ammonia in 24 – that its Evap way down & still appears liquid & pretty clear — 25 has anyother of 6/4 because its loaded

This looks as if a little ammonium had Everything clear in 24 to the end of Way be Useful
Especially when Resin is in

Oct 4/14

Gave Hoffman following 1 Qual Lot of Varnishes to make —
Use all the same resin & as near 16.5 free phenol as possible bring to 22% free phenol

26 =	2 para	7.9 6/4	2% alpha Naphthol
27 =	2 "	7.9 6/4	3% Gum Damar dissolve in oil 1st
28 =	2 para	7.9 6/4	2% Penta nothing else keep cool.
29	3 para	7.9 6/4	
30	2 para	7.9 6/4	4 Penta 1% water
31	2 para	7.9 6/4	4 penta 3% water
32 =	2 para	7.9 6/4	3% strong ammonia – put ammonia in alcohol first before dissolving other things —

Note - Meta Cresol is only liquid not Crystal like Para or chilled it may be this that gives oil in Penta as it probably not Chlorinated ac-uncl-ali,

Phenylhydrazine $C_6H_5 NH NH_2$
Boils 233 Cent solidifies when
Cold to pl. leas which melt
23 Cent Very Sol Alcohol
Used for detecting Aldehydes
Ketones = Oxidizes in the air -
Might ammonia - phenol melts 43 C

Benzen tri chl-phenyl chloroform
made from Boiling Toluene
by chlorine - $C_6H_5 CCl_3$
yellow liquid - penetrating
odor Boils 213 Cent
used in Aniline Dye industry

Perhaps Var wants something
Extremely assblumable
at ordinary temperature like
the stuff in penta -

I had an old Var on my desk
made thus
145 Alcohol
100 Resin
4 Trichlorophenol
8 $\frac{6}{4}$
1/2 pure
6.6 free phenol put in
It was pretty thick been on table
3 or 4 days

I put in tonight 6 grams of
Alcoholic Ammonia + shook it
I noticed when poured on
dish it was Convex whereas

24 + 25 were Concave

25 didnt have all its resin
dissolved but only 2 or 3 grams
not dis - 24 had around 1/2
gram not dissolved,
put in dryer 9.10. pm put on
Vacuum 952 pm -

at 10.5 old Var gives some gas bubbles - 24 + 25 clear

24 + 25 at 1015 both Rubbery

24 has very few fine bubbles
25 has considerable fine
+ old Var has many but none big

24 has hills on surface but no bubbles corresponding to the hills -

The old is now rubbery at 1030 pm -

At Rubbery stage larger bubbles appear on 24 25 + old -

24 with 10 grms Water Rubbery at 1040 pm - some few bubbles of all - bed lacunas

24 10% Water dont settle out like 18%

In No 24 - I add 10 grams of water + shake, it keeps clear but appears to thicken - pour on butter dish -

Put in 8 more grams This is too much clay it -

On asbestos the 18% water Var settles out in Center + separates from the Water although 10% 24 has not done it the clear -

at 1045 #24 18% water put right on hot plate 1 minute dissolved again in water + went rubbery

Green screen #24 18% H_2O used
rubbing on gum in Green
I put it on metal of plate
but only for a minute + then
put it back on rotator

at 1050 put 24 + 25 mixed
on Metal of plate also old Var

All these Experiments with 24 + 25
Shows that Water may play
an important part in the
Varnish

Also that a surprisingly
large amount of water
Can be used without
apparently effecting the
Varnish -

On account of the great
solubility of $\frac{G}{H}$ in water
a little water in Var
will keep $\frac{G}{H}$ well mixed
with the resin + prevent
Crystalization also keep
free phenol liquid + prevent
it from Crystalizing from
the Cold produced by
Rapid evap of the alcohol
Perhaps the ammonia helps

to keep the scula in solution
& probably fries Var sooner
with para than if only
para used

The old Var seems NG
puffs up - lots bubbles &
Rotten - it was 1/2 fried
any way —

Took all off - at 11 pm
dripped - 10 + 18% water
#024 Have white bottom
where water settled -
Looks as if 5% water
was limit - but 7%
on thin flat plates where
there is no low place for
water to concentrate.

All are rubbery but none are hard
I leave them on all nights

24 + 25 right on plate for several
hours covered go hard all thru
1/16 to 3/32 is thickness of middle
Cut easily but is very hard

24 with 10% water also curly
Even tougher than without
24 with 18% water Even better

Note - Used so much G/4 in all
that ~~they~~ none became plastic
at heat of plate 240°F also
probably not at any heat.

Try Phenetol

Ethylic Ester of phenol.
Ethyl phenate.
or Carbolate —
By heat, Na Sulphovinate with
Na phenylate
$C_6H_5-O.C_2H_5-$
Oily Liquid Boils 172
Sp Grav 0.9822

Anisol -

Succinic acid

phthalic ac

I find phenylhydrazine is promising as its a liquid at ordinary temp, thick, oily - It dissolves some 6/4 - saturated with 6/4 it dont condense, want volatile - + will stay as a liquid in Vencer — put 2 of phenol 4 p to say 1 phenylhyzin with alcohol + strong 6/4 poured on dipl it condensed to fine deep red resin with fine surface No bubbles although put plate right on 240 Fahr Looks extremely promising —

Phenylhydrazine from Aniline by Diazo reaction + Reduction affording Yellow red brown oil $C_6H_5-NH.NH_2$ Absorbs Oxygen from the air + reddens Slightly Sol Water Solidifies to plates in Cold Melts 23° Cent Boils 241-2 - Keep well stoppered bottle —

29

25cc Reg Var 903
5 grams phenylhydrazine
at 1030 NG all frothed up not
condensed abandoned

All 26-27-28-29 poured on flat
white butter dishes at 6.10 pm
Oct 6th/14 at 7.50. thick beautiful surface
glistens no sign of a bubble
at 755 all put on dishes on hot
plate in 2 min some very fine
bubbles appear 29 The most
26 2nd - shows it not the phenylhydrazine
at 935 pm none have gone rubbery
26 + 27 about same bubbles as originally
28 more + larger + 29 less more
of fine bubbles looks as if
Cooked
At 9.37 pm put all right on metal
of hot plate

Experiment with Phenylhydrazine

26

25cc Reg 903 Var
1 gram phenylhydrazine
Rubbery at 9.50 pm -
This is only one any good, its still in rubber
stage at 10 50 pm lock off - it puffed in one spot
dont stick to plate - Looks good to work
with 100 @ 200 Milg - 1 gram entirely too much -
+ other thing in 903 may react with it - Am making
new lot Var 27 without pentes

25cc Reg 903 Var
2 grams phenylhydrazine
Rubbery at 10.7.

28

25cc Reg 903 Var 3 grams Phenylhydrazine
put on holler plate 10 50 pm a little rubbery acc
puffed up NG abandoned -
Note 1 gram phenylhydrazine too much
its 10% of Resin - think -
from 100 to 250 milligrams better
may be OK = 1

34 – Dup of 30
100 mlg Glacial phos

The glacial even 100 mlg
dont seem to dissolve
at all – Guess whole
Experiment is a failure

Put in hollow dish at 1130 pm
dried all night put on
Calcination 930 am
Look good –

All these come off the dish
Easy + free – off at 230 pm
but phosphorus neglected them +
they were probably OK long
before this = no bubbles + increase
in bubbles since dried
30 + 33 scarcely any bubbles
33 the least
May be something in
30 & 33 phos acid

Trying Effect of Acids –
30 –

25 cc Reg Var 903
250 mlg Glacial phos acid

31
25 cc Reg Var
500 mlg Glacial phos a

32
25 cc Reg Var
1 gram Glacial phos a

33
25 cc Reg Var
2 grams Glacial phos acid

The specs of undissolved phos acid is seen
in the lower layer of the vessel –
Found if glacial is already dissolved +
syrupy alcohol dissolves an unlimited
amount

Poured out at 1100 pm in
butter dishes — dried all night
this morning Tuesday at 9 30 am
found all full of bubbles
showing most 62 chemical action
put on the bath at 9 30, am

Hoffman brot in some
Resin he marked Not
dehydrated or Some
marked ~~by~~ dehydrated

The Not Dehy had by test
16.6 free phenol

The Dehydrated
14.8 % free phenol

34

Instead of using req 903 I make following

34

20 grams Resin
29 alcohol
1580 Milg 6/4
200 " " Para
100 " Phenylhydrazine

35

Dup but with 200 Milg Phenylhydrazine

36

Dup with 400 Milg "

37

Dup with 800 Milg "
Now all blank but 37 light red transpt
show reaction evidently —
~~poured out 37 and of the~~

38 39 40 glycerol
Phos separates out
39 the least bubbles —
goes Rubbery almost immediately

Phenomenon

Only want a very little
$\frac{1}{10}$ of a% to $\frac{1}{5}$% of the
Resin —

Note = 6/4 starts to decomp. and
around 200 Fahr turns brown
a little at 210 Fahr —

38 1 & 2 Dup

903 Var thick found in ice box —
added about gram or gram + ½
syrupy phosphoric glycerol —
poured two bottles slowly, lots
bubbles from shaking the
Varnish —

39 —

Dup 38 — but 5 grams put in of phos a

40

7 or 8 grams put in precipitated
out lot stuff —

Hoffman made for me a bottle Var, for use in Expmtg - now in ice chest

100 Resin 1616 freq than -
54, Extra phenol
7.9 6/4
140 Alcohol no Pentha or Para.

No 45 is a little Para put in Colors Var white, precip -

41 = + 42

I put 3/16 high in round part of ½" test tube of glacial phosphoric acid & then filled test tube with alcohol to within 1 inch of top + used about 25cc of Reg Var without pentha or para + put in 3/8 inch of length of test tube in 41 + 42 + poured — then put in same bulk again in Var + put it in 43 + 44 I noticed precipitate white Think it precips 6/4 out, Which put on asbestos too quick lots bubbles Condenses in 1 hour

43 + 44

When put on asbestos too quick lots bubbles, Condenses in 1 hour

Have tested it + find phos acid does precip 6/4 but it dissolves in Excess of alcohol & therefore well to do OK + dissolves in the Var if small % phos acid used

Later = I find phos acid precipitates Para white & dont redissolve

46 = Var no para or penta
Big pinch Hydroquinone –

Either small quantity of
glacial phos syrup
or Hydroxchinon make
a veneer on bottles drink
that cannot be scratched
by the finger nail
& is tough cut like
celluloid after being on
hot plate all night
Using Reg V without
Para or penta
PHENOMENON

Valar = Phosphorus acid

Old Penta NG washed acid free
water boiled out –
20 grams put in –
100 of 50 water
100 of 25 "
100 of 20 "
100 of 15 "
100 of 10 "
100 of 5 "
100 of ——— All are filtered & drying

The alcoholic solution of Old Penta is light yellow
& Even 100% of is light
Whereas New Penta is deeper, after filtering
Old Penta dont give a precip out of alcohol
whereas New Penta on standing does
but OP may do so when it stands
same length of time,

OldP dont appear to have much dis
out by 100@50 water whereas NP
appears to have considerable

Weight Residue after Alcoholic Extraction

#41

Al	H_2O	Old Penta	New Penta	Old P Extracted	New Penta Extracted
100	50	14 720	14 640	5,280	5,360
100	25	8 680	10 590	11.320	9.410
100	20	7.720	8 810	12.280	11.190
100	15	7 420	7 550	12 580	12.450
100	10	8 660	7 110	11 340	12.890
100	5	4 610	4 860	12.390	15,140
100	5	7 020	6 940	12 980	13.060

20 grams used

New Lot penta 85 @ 90% good

Transfers —

100 al 50 water
100 al 25 "
100 al 20 "
100 al 15 "
100 al 10 "
100 al 5 "
100 al 0 "

all are filtered & drying

Sandarach Resin is very peculiar dries from alcoholic Sol like Varn when cold brittle not sticky when hot not sticky has fine surface & film like varn varnish - Copals dissolve very little & on bottom dish globules & are sticky hot. Both Mastic & Copals

Hoffman is making 10-gal batch
Req Vcr 7.9 $\frac{6}{4}$ NO Pectin or Pectin
but with ½ per cent of phosphoric
glacial syrupy acid
called the acid Phenolate.

that is all 95% Alcohol will dissolve, so this must not be Exceeded,

90% alcohol 150 cc and 7½ cc water added making 157.5 cc dissolves 1 gram or 250 milgrammes

I now put 250 milg more Chloride of Ammonia in to see if it will dissolve by long shaking 250 more milg of NH_4Cl dissolves making 1½ grams all together in 157½ cc 90% alcohol.

Later 3rd 250 milg more gone in making 1.750. grms altogether The 4th 250 got in — making 2 grams to 157.5 cc alcohol 90% —

See further down

Old Expts using Chloride of ammonium — 5% only 38% is soluble

385 — Free release Transfers 100% no para or Penta
511 " " 83% 100% Consd "
512 " " 83 or 100% Consd "
513 " " 58% or 75% Consd "
514 " " 91% or 100% Consd "
See next page
540 " " 79.1% or 87.5 Consd 2 Para

All plates from covers look very bad, pockmarked, Matte surface, very few discards Transfers slightly smudgy

Looks good — May be we use too much NH_4Cl —

150 cc of Alcohol dissolves as a maximum at ord temp One gram of Chloride of ammonia This is 145 of al to 100 of Resin is one per of Chl Ammonia to 100 Resin

Evidently 1.250 grams NH_4Cl could be got in 95% alcohol probably 1.5 if shook long enough & perhaps a little warm.

Note, Paraphenylenediamine The Chloride is soluble in alcohol & may be preferable to Chloride of ammonia

Get price Sandarach Resin gum

Chloride of Ammonia No Para or Pheno

	Trans	OK	Comml	Ckd	Puffs	Dust	Scratch	OK %
511	12	10	2	1		1	1	83
512	12	10	2	2				83
513	12	7	2	1		2		58
514	12	11					1	91
540	24	19	2		2	2% Para		79.1
385	13	13						100

All free release —

Those that marked Ckd were rated Commercial probably very small Cks —

Oven % good but plates pock marked & looked very bad

These were on old Cresol blanks which probably produced the Cracks —

Gum Kino dries to film - not sticky
its fragile brittle film - probably
Valuable Enough for 3% Sol in
Alcohol - Worth Trying

Dragons Blood, dries up & cakes
at 220 Fahr to dry shiny non
sticky film acts like Sandarach
but somewhat brittle at 175 @ 200
whereas Sandarac is tough
like Sandarac -
This Dragons blood is amorphous
gives a shiny surface
Dissolves fine in alcohol
Its a little gummy but was
too rapidly dried

Gum Thus dries sticky
Kauri " "
Euphorbium " "
Myrrh " "
Ammoniac film not much sticky after 220°
Guaic not least sticky " " brittle
hard scant scratch doubtful of sol
Enough

	lb
Aloes	13 @ 14
Arabic	30 @ 35
Ammoniac	30 —
Euphorbium	20 —
Gamboge	80 @ 90
Guiac	16 @ 35
Kadaya	16 @ 25
Kino	50 —
Mastic	100 @ 110
Myrrh	25
Olibanum	12
Sandarac	28 @ 30
Scammony	225 @ 230
Senegal	14 @ 22
Thus 280 lbs	900. @ 1000
Dragons Blood	45 to 80 Cents lb -
Elemi	45c Cents and probably less

Gamboge after 220° Dry thin film
think 3% will dissolve -
Scammony very thin film fragile very
little dissolves - Senegal only trace
dissolves
Olibanum should say would
do to give 3% - its tough like
Elemi.
Elemi is quite sol in alcohol all night at 200 OK
nothing comes off soft + tough like -

Rosin 16.6 free phenol.
50 grms saponified by NaOH.
Then precipitated by HCl -
filtered - The acid solution
contains 5 or 6 grams of
what appears to be Resolic
acid probably some Resorcin
probably the results vary
very much & some have more
or less of Resolic & this
to extent of 1% or more
possibly this is one of
the things that gives us
trouble at 240 for 24 hours
on hot plate, keeps consistent
is thick but takes sticky liquid
cold its solid but viscous &
is sticky -
Tried to condense it with
6/4 but dont do much

Sandarac Resin. almost
entirely saponified & made
soluble in water by
boiling = precipitates
OK -
cannot get clear solution
by filtering - even with
Bone black -

Powdered Sandarach
washed in boiling
water, water that
comes then cloudy
probably this is
good way to purify
when it reaches a
boil it goes together
but when cooled and
comes apart & dries

very muddy on filter paper –
This is good way to partially purify

Also Sandarac
decoctions in NaOH.
Turns brown –
precipitates OK but
cant get clear
solution, even with
Bone black – this
runs thru + blackens
filtrate

The Sandarac should be picked
by a girl to get chips out.
probably we shall have
to get rid of the small
amount of Resin which
looks say decomposes
at 212 etc this which
probably makes bubbles

I melted Sandarac but it
dont melt to clear but
froths awful + I keep it
melted for ½ hour but
still frothed bad, turned
darkish red. Water
clear + a little opalescent
large amount of resin
order make came off
think this will be necessary

to get rid bubbles —
I am also treating with
NaOH, & precipitating

Olibanum dissolved to
saturation with Lots 6/4
& dried gives no bubbles
if dried all night on glass
plate 1" high over hot
plate, & then put right
on iron steam plate
240° Dont give any
bubbles like Sandarac
Resin bubble but not very
bubbles — pretty good
Resin for us — The old
Resin had here 20 yrs
& that new resin which
is softer —

Semi Melted Sandarac washed
then dried & powdered, turns
yellow — 25 grms dissolved
in 60cc alc — poured on bottom
dish set on glass plate over
Hot plate 1" therefrom, still
gives big bubbles so this
process dont do. To
stop bubbles & left in
oven —
I still have another plate
drying near hot plate 8 hour
shows no bubbles —

From Gmelin Vol 17 429

Sandarac dissolved in Alcohol —
Then add Alcoholic KOH, This
precipitates Gamma Resin —

Alpha & Beta resin remain in solution
add 60% Alcohol this precipitates
Beta Resin —

The Solution Contains Alpha

When the precips produced by Alcoholic KOH from Alcoholic Sol of Sandarac is boiled repeatedly with 84% Alcohol The Beta resin Compounded with KOH dissolves —
This leaves the Gamma resin with KOH, This is dissolved in 60% Alcohol + decomposed by hot HCl. Its a difficult fusible body
Rather decomposition
NG —

Oct 16/14

Sandarac

Part dissolved by Benzol is about 1/3 perhaps less it is the beautiful clear resin pulls out to threads like finest Spider web fast long Its sol in alcohol readily

The part not dissolved is light + infusible right on hot plate dissolves alcohol - after fusing gets cloudy again —

Hard to say which resin does the business -

Fred OCC is separating 3 lbs with Benzol to make a test, They are Certainly different Resins entirely = That dissolved in Benzol gives no bubbles whatever — perhaps it will with alcohol on account of the water in alcohol

Using 1500 grams of Sandarac powdered & Extracting it with Bengal C P I find 1/3rd of it is soluble in Bengal & gives a very beautiful Resin. Transparent & when warm can be pulled into threads as fine as spider webs 3 ft or more long – it will melt & stay semi viscous on hot plate 240 Fahr for days without changing. The Insol is white powder forming 2/3 of it

Oct 16/14

I am making two 10 gal run of varnish using both Rosin & white rosin to find out which produces the good results – I want to get rid of bubbles in Resins & get out the impurity that gives them –

11 Nov 1914

Experiments in mfg phenol from Benzol – I find the lime from neutralizing the H_2SO_4 & Benzene Sulfonate of lime by Lime is hard to get lime free by filter presses, by washing under pressure 25 lbs – I get 25 lbs water Extra for each lb of phenol which is excessive – I have just tried getting out Benzene Sulfonate by Displacement Column Column 23" long – 6" is filled with the pulp – 17" water

over of the water is colored
blue by Azulene -
Took 1 hour to run thru before
blue showed -

~~Blue~~ this contained pbly 80%
of the Benzyl sulfonate of Lumi
210 cc - 1 hour

2nd lot water came thru tinged
blue - 35 minutes 140 cc

3rd fraction took 40 minutes
180 cc - very blue

4th fraction 110 cc took
30 minutes very blue

Displacement Expt.

2" glass tube . 12" – 6

Sludge –

		BenzuSO_3	grams
1	270 cc water –	10.8 %	29.20
2	275 "	8.5	23.40
3	85 "	0.4	0.34

4 Blue – 60 cc
5 50 cc
6 110 cc
7 50 cc
8 70 cc
9 50 cc

} no BenzuSO_3

9 % Solution of BenzuSO_3 in water
Too unchanged –

Think of 100 of NO_2 lotion
& would show precipitating
all there is –

The Dye was done above
by the BenzuSO_3 + H_2SO_4 lines –

OCTOBER 1914. — PERCENTAGES

DAY MADE	VARNISH	LOT No	6/4	PLATES	OVEN — UNIVEN.	DISCARD — RAISED	BUBBLES	OTHER DISCARD	TOTAL DISCARD	TOTAL OK.	TRANSFER — BLANK	CRACK Varnish	OTHER DISCARD	TOTAL DISCARD	TOTAL OK.	TESTER — RECORD	KNOCK	Feed-Line CRACKED	CRACKED	HOLES	POOR Print	TOTAL DISCARD	TOTAL OK.	DAY TESTED
OCTO 17.	1070.	661	8.4.	695.	14.2	5.	8. 1.	5.	32.4.5	663. 95	331	2.0.6	—	2.	329. 99.2	262	5.2	32 12	—	15 5.	5 2.	60 22.6	202 77.5	October 20
19	1071.	663.	8.2	3,455	53.1.5	61. 1.5	91. 2.6	82. 2.	287.8.3	3168. 91.3	1584	67.4.		7.	74.4.1	1,369	50.3	80. 6.	15. 1.	57. 4.	11. 0.	268 20.	1101 80.	" 22.
20	1072.	665	8.2.	3,591.	115.3	26. 2	41. 1.	93. 2.5	275.8.	3316. 92	1658	40.2.		—	40.2.	1,554	23 1.5	24. 1.5	102 7.	31. 2.	50 3.	270 17.	1284 83	" 24.
22	1072.	669.	8.2	3,442.	11. 0.	539. 15	27. 0.	20. 0.	597.17.	2844. 83.	1422	136 9.		2.	138. 9.	1,220	90. 7.	51. 4.	32 3.	51 4.	37. 3.	314 25.	906 75	" 26
21.	1074.	667.	8.4.	3,482.	38. 1.	32. 1.	83. 2.5	67. 2.	220 6.	3262 94.	1631.	68 4.		—	68. 4.	1,499.	29. 2.	64. 4.	61. 4.	72 5.	38. 2.	317 21.	1182 79.	" 24.
24.	1072.	672	8.2	6,440	56. 1	23. 0.	65. 1.5	70. 1.5	214.4.	6226. 96.	3113.	218 7.		4.	222 7.	2,526	111. 4.	259. 9.	166 6.	167. 6.	199. 7.	1028 37.	1798 63	" 28
23.	1075.	671	8.4.	3,582	44. 1	72. 2	31. 1.	35. 1.	182.5	3400. 95	1700	54. 3		2	56. 3.	1,580	67. 4.5	97. 6.5	43. 1.	53 3.5	67. 4.5	370 23.	1210 76	" 27.
26	1076.	676	8.6	3,440	32. 1	176. 5.	32. 1.	35 1.	275.8	3165. 96	1583	106. 7.		4.	110. 7.	1,409	72. 5.	89. 6.	82 6	118 8.	60 4.	481 34.	928 66	" 29.
26	1072.	674.	8.2	10,670	97. 1.	142. 1.	73. 1.	63 0.	375.3.5	10295. 96.6	5219.	135.2.5		18.	153. 3.	4,927	275.6.	322 7.	146 3.	154 3.	154 3	1194 24.	3733 76	" 30.
27	1075.	677.	8.4.	9,140	47. 0.	243. 2.5	115. 1.5	68 0	473.5.1	8,667. 94.9	4339.	163. 4.		11.	174. 4.	3,958	161. 4.	206 5.	145. 3.5	621.15	160 4.	1397 35.	2561 65	" 31
28	1072.	680.	8.2.	9,424.	51. 1/2	128 1.	114. 1.	41. 0.	334.3.5	9090. 96.5	4512.	224 5		27.	251.5.5	4,261. 94.5	127. 3.	267. 6.5	186 4.5	366 9.	167. 4.	1251 30.	2799 67	Nov 2
"	1072.	682	8.2.	4,239	26. 1/2	66. 1 1/2	43. 1.	23 1/2	158.3.7	4081. 96.3	2041.	89 4.5		4.	93. 4.5	1,948. 95.5	110. 6.	61. 3.	38. 2.	186 10.	49. 2.	555 30.	1275 67	" 2
29.	1072.	684.	8.2.	10,504	51. 1/2	88. 0.7	83 0.7	66. 1/2	288 2.7	10216. 97.3	5113.	185 3.5		12.	197. 3.5	4,916. 96.3	205 4.5	256 5.	140. 3.	360 7.5	137. 3	1316 28.	3332 72	" 3
27.	903.	679.	8.	5,524	15. 0.	38. 1/2	84. 1 1/2	45. 1/2	182.3.2	5342. 96.7	2659.	143 6		142.	285.10.7	2,374. 89.3	105. 4.3	92. 4.	150. 7.	143. 6.	48 2.	580 26.	1633 75	" 2/3
30.	1072.	686	8.2	11,457	78. 0.7	174. 1.5	1107. 9.	61. 0.	1420.12	10037. 87.5	5028	153 3		71.	224. 4.	4,804. 95.6	272.5.5	203. 4.	216. 4.	682 14.	82 2.	1614 34.	3118 62	" 4/5
30.	1072.	688	8.2.	6,476	5. 0.	11. 0	3501.54	12. 0.	3529.54	2947. 45.4	1340	51 3		23.	74.5.6	1,266. 94.5	36.3.3	27. 2	34 3.	65. 6.	22 2.	234 21.	846 78	" 6/7.
Nov. 2.	1072.	690	8.2.	12,170	10. 0.	16. 0.	10068.82	11. 0.	10105. 53	2065. 17.	1487.	28. 2		20.	30. 2.	1,957. 98	118. 4.	28. 2	20. 2.	105. 7.	11. 1.	344. 26	975 74	" 6/7.
3.	1072.	692	8.2.	12,278	12. 0.	2 0.	5317.43	31. 0.	5362 43.6	6916. 56.4	3521	127.4		27.	154.4.3	3,367. 95.7	124.3.8	58. 1.7	113.3.7	118. 3.7	54. 1.7	630 19.	2556 80	" 6-7/8
4	1072.	696	8.2	4,385	62.1.5	53. 1.	87. 2.	54 1.	256.5.4	4129. 94.6	2073	58 3		25.	83. 4.	1,990. 96.	301.5	9. 0.	59. 3.	56. 3.	20 1.	258 13.	1690 80	" 6-7/9
4	1074.	697.	8.4.	5,458	21. 0	50. 1/2	111. 2	42 1/2	224.4	5231. 95.9	2598	152 6		7.	159. 6.	2,439. 94.	80 3.3	42 2	137. 5	83. 4.	46. 2	455 19.	1971 81	" 7/9
5	1075.	699	8.4.	5,906	79. 1.3	71. 1.	136.2.3	70. 1.	356.6.	5550. 94.	2800	87 4.		8.	95 4	2,705 96	83.3.2	29 1.	93 4	76 3.	25 1.	352 15.	2190 85	" 9-10/11
6.	1075.	701	8.4.	12,777	79. 0.6	128. 1	224.2	84. 0.6	535.4	12242. 95.4	5804	292 5		13.	305.5	5,499. 94.4	109.4	144. 2.6	262. 4.3	238. 4.3	91. 1.6	1079. 19.	4409 80	" 9/10
6	1075.	703	8.4	674	4 0.6	2 0	10.1.5	0 —	16.2.3	658. 97.7	329.	11 0.3		—	11 3.3	318. 96.7	15. 5.	2 0.6	12. 4.	0 —	4 1.3	35. 11.	268 85	" 10/11
6	1075.	704	8.4.	600	1. 0.	7. 1.	2.0.3	1. —	11.2.	589. 98.	295	6. 2		—	6.2.2	289. 98.	33.12	4. 1.4	22.8.	8. 3.	9. 3.	91. 33	1836 66	" 10/11

PERCENTAGE.

				OVEN.								TRANSFER.		TESTER.												
DAY MADE	VARNISH	LOT No.	6/4.	PLATES	UNIVEN	RAISED	BUBBLES	OTHER DISCARD	TOTAL DISCARD	TOTAL OK.	BLANK	CRACKED VARNISH	OTHER DISCARD	TOTAL DISCARD	TOTAL OK	RECORD	KNOCKS	Feed LINE CRACK	CRACKED	HOLES	POOR PRINT	TOTAL DISCARD	TOTAL OK	DAY TESTED		
Nov. 5	1078	700	8.4	6314	4.0	11.1	19.3	2	365	94.6 6314.	299.	25.	1. –	768	91.9 273	273.	1.0	3.1	8.3.	1.0	2.0	3011	88.9 779.	10/4	12.	
7.	1079.	705	8.4.	7094	29.0	24.0	121.1	46.0	220.3	96.9 6874.	3447.	220	19.	239.7.	93 - 3708.	3210	1111.	89.2	147.4	105.3	50.1	19.5 626	80.6 2554.	"	10/11.	
9	1079.	707.	8.4.	10908	59.0	254.2	177.1	72.0	592.5	94.9 10316	5157.	121.	31.	452.8	91.3 4705	4677	253.5	172.3	211.4	94.2.	83.1	20. 935	80. 3742.	"	11/12	
9.	1081.	709.	8.2	5070	32.0	68.1	90.1	50.1.	240.4	95.3 4830.	2415.	149.	5	154.3	97. 2261	2274	108.4	41.1	63.2	59.2	11.0.	11.2 362	88.9 1712	"	11/12	
10	1081	710.	8.2	10500	49.0	199.2	228.2	80.1.	556.5	94.7 9944.	4972.	266.	6.	274.6	94. 4695	4437	131.2	82.1	219.4	91.2	79.1	16.6 739	83.4 3698	4	12/13.	
10	1081	713.	8.2.	5277	43.0	21.0	130.2	30.7	224.4	95.8 5053	2526.	177.	1.	178	92.2 2320.	2328	43.1	31.1.	58.2	51.2	25.1.	10.4 243	89.6 2077	"	14/16.	
11	1081.	714	8.2	10500	75.0	63.0	204.2.	68.0	410.4.	96. 10090.	5045.	338.	1.	339.6	93.3 4706	4891	263.5	97.2.	127.2	164.3	63.1	20. 978	80. 3913.	"	16/17.	
11	1081	716	8.2	4790	68.1	31.0	104.2.	37.0	240.5	95. 4550.	2113.	84.	3.	87.4	95.9 2026	1989.	82.4.	49.2	52.2	63.3	33.1	16. 320	84. 1669.	"	16/17.	
12	1079	720	8.4	4260	31.0	17. –	60.1	36.0	146.3	96.6 4114.	2027.	148.	43.	191.9	90.6 1836	1828	81.4	70.3	52.3.	69.3	59.3	19.6 360	80.4 1468	"	17/18/19	
13	1081	722	8.2	7955	44.0	39.0	170.2	50.0	303.3	96.2 7652	3828	265.	–	265.7.	93. 3563	3536	190.5	167.4	105.3	125.3	99.2	21.5 759.	78.5 2777.	"	18/19.	
13	1084	724	8.2	3397	17.0	13. –	51.1.5	19.0	99.2	97.2 3300	1689.	219.	13.	–	87. 219.1470.	1456	82.5	51.3	67.4	46.3	28.1.9	21. 305	79. 1151.	"	18/19	
14	1079	725	8.4	5933	35.0	34.0	105.1	27.0	201.3	96.7 5732	2654.	393.	14.	54.	83.2 4716 2207.	2193.	134.6	163.7	66.3.	48.2	72.3.	24.3 535	75.7 1658	"	19/20.	
14.	1087.	728.	8.4	3554	5.0	31.0	62.1	19.	117.3	96.8 3437.	1642.	266.	16.1	39.2	18.5 305.	81.5 1337.	1343.	83.	98.7.	15.1	24.1	21.2 286.	78.8 1057.	"	18/19	
16	1083.	731	8.4	9940	54.0	164.1	96.0	59.0	373.	96.3 9567	4737.	744.	15.7	92.1.7	17.6 836.	82.4 3901.	3871	163.	277.7.	70.1.8	46.1	21.2 847.	78.3 3044	"	19/20	
16.	1083.	734.	8.4	4870	29.0	72.1	83.1	36.	220.	95.5 4650	2319.	26.2 610.	54.	1.9	28.6 664.	71.4 1655	1657.	4.2 71.	6.4 107.	41.2	38.2	20.8 62.3	346.	1311.	"	19/20.

[ITEMS(S) FOUND IN BOOK]

8.2	8.4
Feedline	Feedline
2.4	1.4
Cracked	Cracked
3.2	4.2
Holes	Holes
7.7	3.6
Poor Print	Poor Print
2.4	1.4

[ITEMS(S) FOUND IN BOOK]

Summar

75%

399 2½% 12 Trans 9 OK 3 seconds hair crack - no discards free rel
485 12 " 5 OK 3 " 3 pullout - 4 Dis free release
486 12 " 6 OK 6 dis - 4 prob 2 ckd free release
487 24 plates 4 Discs 2 OK 2 2nds Transfer 1 OK 2 dis
all have bubbles - 7 plates no crack 20 plates ckd
Not leaked NG

519 24 plates 12 Trans 11 OK 1 Dis - ckd - free release
Final Kept Transfer 9 OK 2 dis ckd 1 2nd small crack
some bubbles on all plates. 5 plates discarded
Cracked 1 - marked good 75% 75%

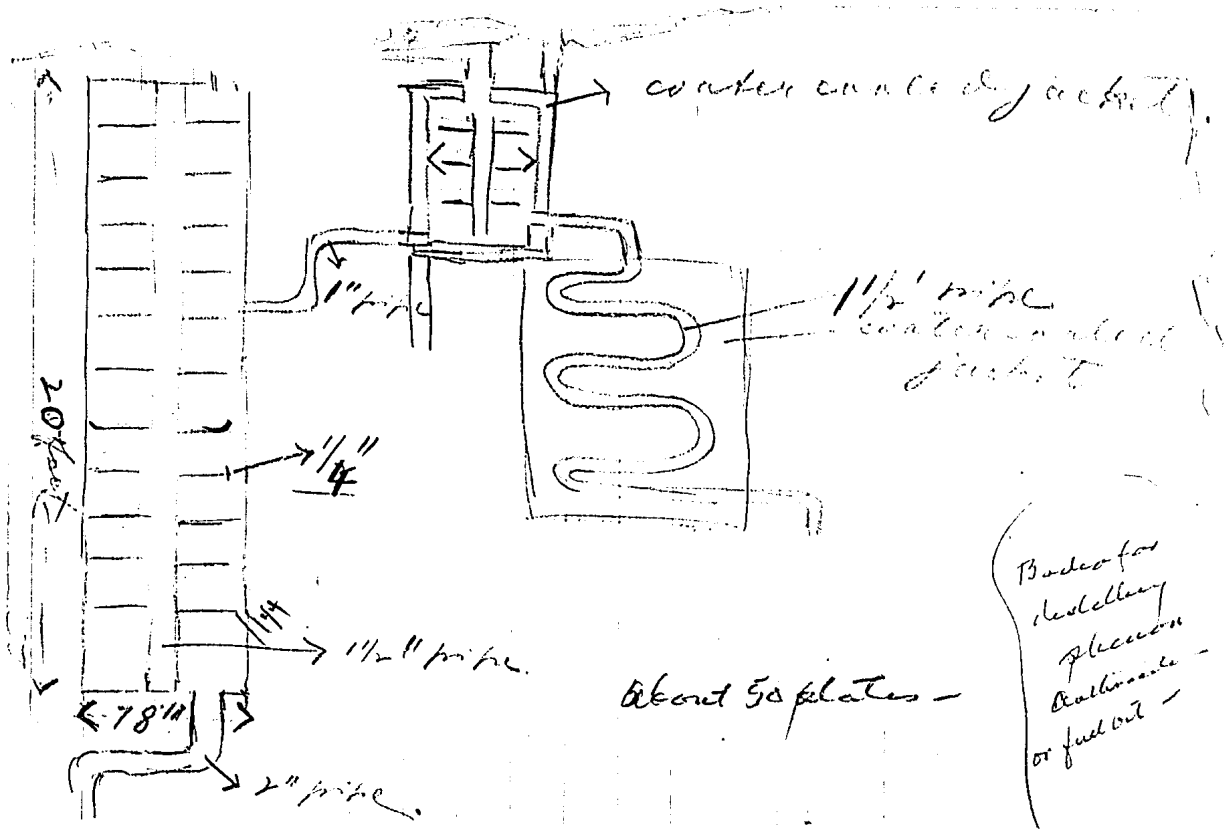
538 2% para 23 Disc 20 OK 3 Dis - (2 ckd 1 prob)
Very good free release - Transfers final
inspection OK 19 Discards 4 ckd -
46 plates 2 dirt, 2 raised - Oven looks very
good - 82.6

12% or 53% Sol. 6% Too much -

3% with 2 para is Best

probably 2% solubility 6.2
better - Even 1% weight is just the thing

[ITEMS(S) FOUND IN BOOK]

1006 Reg 903 but only 7.6 6/4	315	52%	20 118	[illegible]
1007 - 2 para 7.8 6/4	205	73%	20	[illegible]
1008 free phenol 25% 1% Para	216	74	39	[illegible]
1005 (903) Except 7.7 6/4 16.5 free NH	273	31%	162	[illegible]
Reg	5281	70%	1292	[illegible]
1008 25% phenol 16.8 Resin 1% Para	312	67	62	39
1011 16.5 2% Para 4% Penta acid by NH	306	65	66	36
1012 16.5 Penta chloride 4% no phenol	297	79.8	45	15
1013 15.4 5% added (903 Var) Except 1% Para	323	76	46	29
991 2% Para	282	76	2	62
1018 16.6 1% Para 8% (41) Penta	100	75	10	15
1019 16.6 " 7.8 6/4 2 Penta (41)	100	72	18	10
1020 16.6 2 para 8 6/4 No Penta	100	45	46	9
982.				
982.				
982 C - difference (41) Penta - HCl	318	91	00	26
981				
981 - def w (41) Penta + Feeds	303	89.7	4	27
1016 903 with old double made 16 wk ⊕	282	86	9	30
1018 16.6 1 Para 8 Penta 7.8 6/4 (41)	280	72	31	36
Reg (41) Penta	285	78	26	33
1019 (41) Penta 16.6 1 Para 7.8 6/4 2 Penta (41)	306	71	54	27
1024 3% Para-Phenylhydrazine	100	44	23	33
1023 glacial 2 Para 4 Penta (41) 1 water	100	52	35	13
1022 3% Gum Dammar 2 Para 7.9 No Penta	340	84	9	43
1021 Alpha Naphthol	314	59	93	34
1020 16.6 8 6/4 No Penta 2 Para	350	59	82	60

[ITEMS(S) FOUND IN BOOK]